STUDIES ON MARINE BRYOZOA.

XIII. TWO NEW GENERA AND NEW SPECIES FROM ANTARCTICA

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The purpose of the present study is to describe two new genera, *Toretocheilum* and *Isoschizoporella*, and a new species, *T. absidatum*, from Marguerite Bay, Antarctica, and to elevate a previously known variety, *Schizoporella tumida* var. *tricuspis* Calvet 1909, to species rank: *Isoschizoporella tricuspis* (Calvet) 1909. The two species were collected for the Smithsonian Institution by the U. S. Navy's 1947–1948 Antarctic Expedition (hereafter referred to as USN) by Comdr. D. C. Nutt. The writer wishes to express her very grateful appreciation to the Smithsonian, U .S. National Museum, for the loan of these specimens and to the National Science Foundation for grants so generously supporting this and related researches.

Both species belong to the family Hippoporinidae as redefined by Osburn (1952, pp. 316 and 343). He limited the family to include those schizoporellid species which have a pleurocyst or olocyst type of frontal wall with marginal areolar pores (areolae), avicularia, usually strong cardelles, orifice and operculum constricted at sides, in some species at least.

GENUS *TORETOCHEILUM*, NEW GENUS

Diagnosis. Colony encrusting. Zooecia entirely adherent. Dietellae present (Fig. 9). Zooecial front wall convex, an areolate and moderately costate pleurocyst. Frontal not otherwise porous. Large pointed adventitious avicularia on front, over areolar pores (Fig. 1). Globose ovicell with areolae around border in ectooecium or where ectooecium and entooecium meet (Figs. 2, 3, 5). Ovicell partly immersed in next distal zooecium (Fig. 5). Zooecial operculum does not close ovicell aperture. Low spine-bearing peristome surrounds zooecial orifice (Figs. 1, 6, 10). Orifice suborbicular, laterally and distally bounded by a C-shaped vestibular arch which supports the operculum (Figs. 6, 7). Vestibular arch ends proximally on each side in thick ledge-like cardelle (Figs. 8, 10). Between the cardelles is a gap or inner sinus closed by the tab of the operculum (Fig. 8). In front of this, externally, the low peristome rises to form two curved cusps which encircle the rounded median peristomial sinus (Fig. 10).

Name derivation. The genus was named *Toretocheilum*, meaning "pierced lip," because of the sinus-pierced proximal peristome which forms the lower "lip" of the orifice. It is of Greek derivation (see Brown's lexicon) from *toretos*, bored or pierced, and *cheilos* (neuter noun), lip or rim.

Type species: Toretocheilum absidatum, n. sp.

Type locality: Marguerite Bay, Antarctica, Sta. 240.

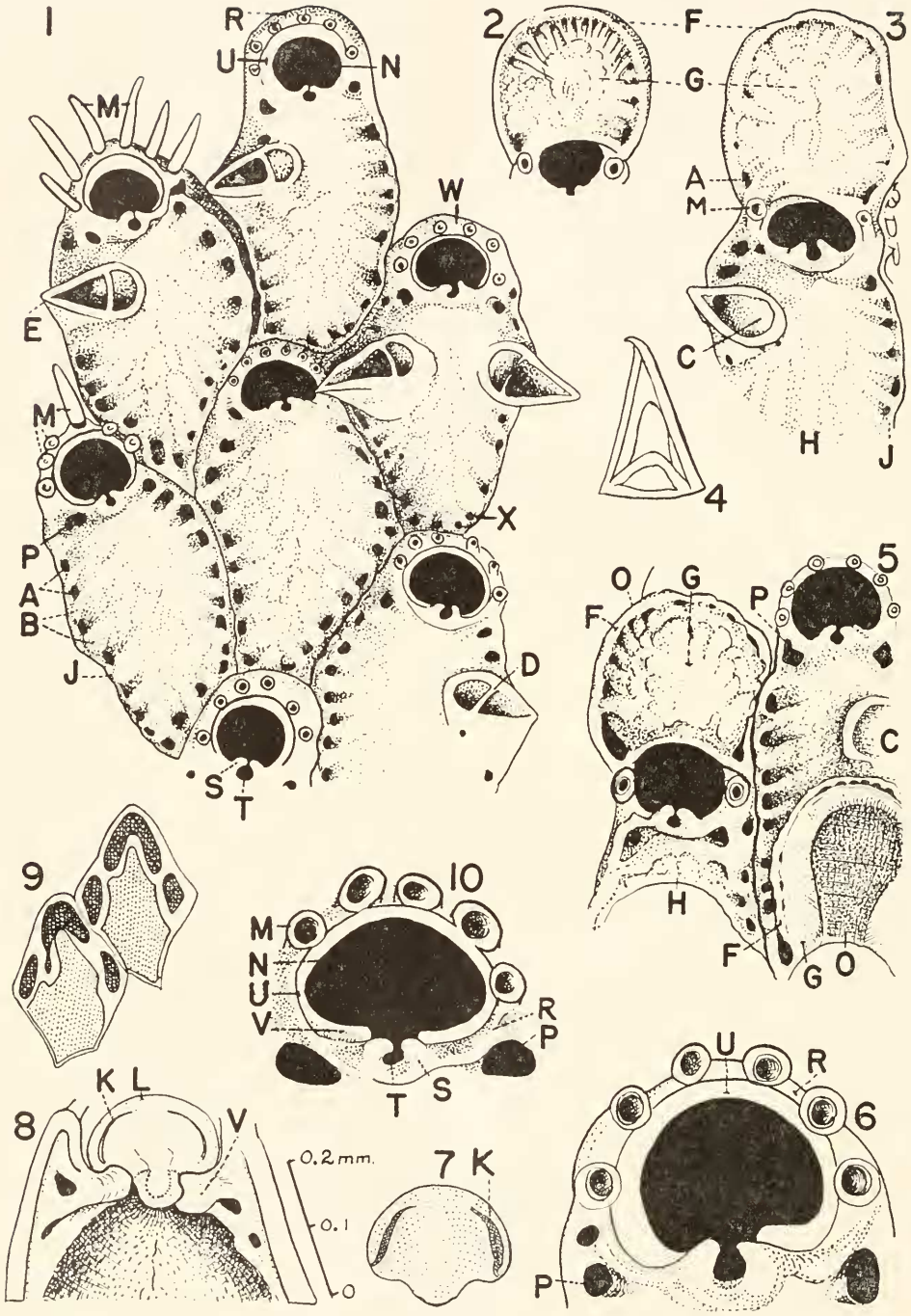
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PLATE I.

Remarks. The new species *absidatum* presented a problem in identification and relationships. It had features strongly allying it to both genus *Chiastosella* and genus *Stephanosella.*

Chiastosella is known only from the southern hemisphere and is represented by both fossil and Recent species. *Stephanosella* has a wider distribution.

Chiastosella is classified in different families by different authors. Stach (1937) and Brown (1952) allocate it to the family Schizoporellidae, while Bassler (1953) allocates it to the family Hippoporinidae, which was once a subfamily of Schizoporellidae but which is now a separate family. Bassler (1953) and Osburn (1952)

Toretocheilum absidatum, new species

List of Abbreviations Used on the Plates

A Areolae or areolar pores
B Areolar costae
C Avicularial chamber
D Avicularial pivot
E Avicularium
F Ectooecium of ovicell
G Entooecium of ovicell
H Frontal wall
J Mural rim
K Opercular sclerite
L Operculum
M Spines or spine bases
N Orifice of zooecium
O Ovicell
P Paraoral areolar pores
R Peristome
S Peristomial cusps
T Peristomial sinus
U Vestibular arch or collar
V Vestibular ledge or cardelles
W Distal part of zooecium
X Proximal part of zooecium
Y Distal wall
Z Lateral wall

PLATE I

All figures on this plate are of *Toretocheilum absidatum,* new genus and new species, and are drawn with the aid of a camera lucida.

Figure 1. Seven calcined non-ovicelled zooecia, some with one or two avicularia, some without any.

Figure 2. An ovicell drawn directly from the rock under low power (dissecting microscope). Above the two spine bases are the spaces ("pores") between ectooecium and entooecium.

Figure 3. A calcined ovicelled zooecium with an avicularial chamber in which the underlying areolar pore is visible. The floor of the avicularial chamber is the frontal wall of the zooecium.

Figure 4. Mandible of an avicularium.

Figure 5. Two young calcined zooecia, the one at left ovicelled, the one at right non-ovicelled. At lower right, imbedded in the proximal front wall of the latter, is a damaged ovicell which belongs to a zooecium below those shown. The front wall of the damaged ovicell is broken off, exposing the inner wall of the ovicell. The ovicell rim shown over the orifice later becomes reduced as calcification proceeds.

Figure 6. External view of orifice of a non-ovicelled zoid. One cardelle of vestibular arch is hidden by a peristomial cusp.

Figure 7. Operculum with curved sclerites for muscle attachment. The median tab below fits the space between the cardelles and the back of the cusps.

Figure 8. Interior of the frontal wall, operculum and half the orifice. The thick ends (V, ledges or cardelles) of the vestibular arch hold the operculum in place. Through the opercular tab can be seen the peristomial cusps and peristomial sinus. These peristomial structures are external to the operculum. Drawn to the 0.2 mm.-long scale at right.

Figure 9. The attached back or basal wall of two zooecia, showing the three distal darkly shaded dietellae of each.

Figure 10. Zooecial orifice tipped forward to show the exact relation of the C-shaped vestibular arch and vestibular sinus to the peristomial cusps and peristomial sinus.

place *Stephanosella* in the family Hippoporinidae. The difference between the two families is based on the nature of the orifice and the frontal wall.

The new USN species *absidatum* is closer to *Chiastosella daedala* (MacGillivray) 1887, type species of *Chiastosella* Canu and Bassler 1934 (see Bassler, 1934, p. 407) as regards the distinctive orifice, peristome, spines, and avicularia but differs in the type of frontal wall and ovicell porosity and sculpturing. In the latter features (frontal wall and ovicell) *absidatum* is closer to *Stephanosella* Canu and Bassler 1917, but the orifices are quite different.

Chiastosella at present contains a diversity of species (*cf.* Stach, 1937; D. A. Brown, 1952, 1954) that could split the genus between two families (Osburn's limited families Hippoporinidae and Schizoporellidae). Therefore, it was thought more sensible to erect a new genus *Toretocheilum* for the dissident and complicating USN *absidatum* than to further diversify the genus *Chiastosella* by including a new species of such divergence from the type *C. daedala*.

Diagnosis. Colony encrusting, well calcified. Zooecia convex and approximately hexagonal. Frontal a pleurocyst with one row of areolae, the paraoral pair often more pronounced. Areolar grooves and costae prominent. None, one or two large transverse, pointed avicularia over areolar pores on mid-frontal corners. Five to 7 stout oral spines on peristome. Orifice suborbicular, lined by a C-shaped vestibular arch whose ends form prominent blunt cardelles proximally. Proximal border of orifice straight to concave, with round, median sinus inserted between or flanked by two arched cusps. Ovicell with row of areolae where ectooecium and entooecium meet peripherally, but otherwise non-porous. Ovicell has faint proximal rim, bordered by two oral spines. Three or more large basal dietellae.

Name derivation. The species *T. absidatum* was named for the arched proximal peristomial cusps which outline the median orificial sinus, and also for the remainder of the arched orifice. The trivial name is derived from the Latin *apsis* (*absis*), arch; *absidatus*, arched, vaulted. (*Cf.* Brown's lexicon.)

Measurements. Given below are minimum, maximum and the average of a number of readings, usually 10, in millimeters. L is for length, W for width, D for diameter.

0.965–1.267	(1.081)	L	zooecia
0.432–0.763	(0.634)	W	zooecia
0.576–0.605	(0.586)	L	ovicell, 4 readings
0.547–0.576	(0.566)	W	ovicell, 4 readings
0.202–0.245	(0.217)	L	orifice, including sinus
0.216–0.245	(0.230)	W	orifice
0.014–0.058	(0.033)	D	sinus
0.259–0.331	(0.297)	L	avicularium
0.130–0.173	(0.151)	W	avicularium
0.216–0.346	(0.250)	L	oral spines, 6 readings
0.029–0.058	(0.045)	D	oral spines
0.163–0.202	(0.182)	L	mandible, 4 readings
0.124–0.130	(0.128)	W	mandible, 4 readings

Colony. Four small patches of colony were found encrusting a thick flat hand-sized rock from Marguerite Bay. Pieces had to be scraped or burned off for study

because they were on the sides of the rock in areas that could not be maneuvered for study under the compound microscope.

Zooccia. Zooecia are box-like, their fronts 4- to 6-sided. The side walls are vertical, low and about the same height all around. Three or so large dietellae outline the distal half of the basal wall (Fig. 9).

The frontal wall is very convex, mound-like, with thin, raised mural rim. A row of deeply sunk oval areolae outlines it. Grooves radiate centerward from the areolae. Short costal ridges separate them.

The frontal wall consists of a translucent calcareous olocyst fast overgrown by an opaque granular or roughened pleurocyst. The central part of the pleurocyst is non-porous except for an occasional pore puncturing the avicularial chamber near its base. The areolar pores are not large but the grooves and ridges make them more conspicuous than would otherwise be the case. The two areolae nearest the orifice corners are often slightly larger than the others (Figs. 5, 6). In young, less heavily calcified zooecia the grooves leading from these two paraorificial areolae pass just proximal to the orifice, leaving the orifice elevated slightly above the immediate frontal wall (Fig. 5).

Avicularia. Avicularia are all of one type and of approximately the same size. Usually one, sometimes two, large pointed avicularia occur on some zooecia. Other zooecia may be without any. If two avicularia are present on one zoid they are placed bilaterally, opposite each other. Avicularia are located at the corners over areolar pores, midway up the side of the front wall. They are transversely oriented with mandible pointing out. Sometimes they slant a bit obliquely (Figs. 1, 3).

Each avicularium is mounted on a prominent avicularial chamber which tips the avicularial beak to a slightly upward-directed or oblique position. The avicularial chamber is large at the base and covers one or two areolae. As is the custom in calcified species with large adventitious avicularial chambers, there is an occasional small pore perforating the chamber wall near its base, probably for hydrostatic reasons.

The avicularial back area is hemispherical. The beak is pointed. Separating them is a straight pivot bar on which the base of the triangular mandible rests. The mandible is a tall narrow triangle, with curved tip and a lucida near its base (Fig. 4).

Orifice. The unusual orifice of *T. absidatum* made it difficult to classify because either few species have this type or else if they have it the illustrations generally do not show the orifice in very great detail.

The orifice is tipped forward a bit distally so that it seems horizontal. In front of it the frontal wall soon rises like a mound. The orifice is placed at the very extremity of the frontal wall.

It is lined by a C-shaped inner collar, the vestibular arch, whose ends curve around proximally to form the cardelles (Figs. 8, 10). The cardelles are sturdy, blunt, smooth usually and separated from each other by a median gap approximately one-third the width of the orifice.

In front of the gap is the rounded spout-like sinus whose walls are formed by the two curving cusps which arise from the proximal wall of the peristome (Figs. 6, 8, 10). The sinus and gap form an inward slanting channel. In young zooecia the orifice with the frontal peristomial tabs and sinus is set off from the zooecial

Isoschizoporella tricuspis (Calvet) 1909

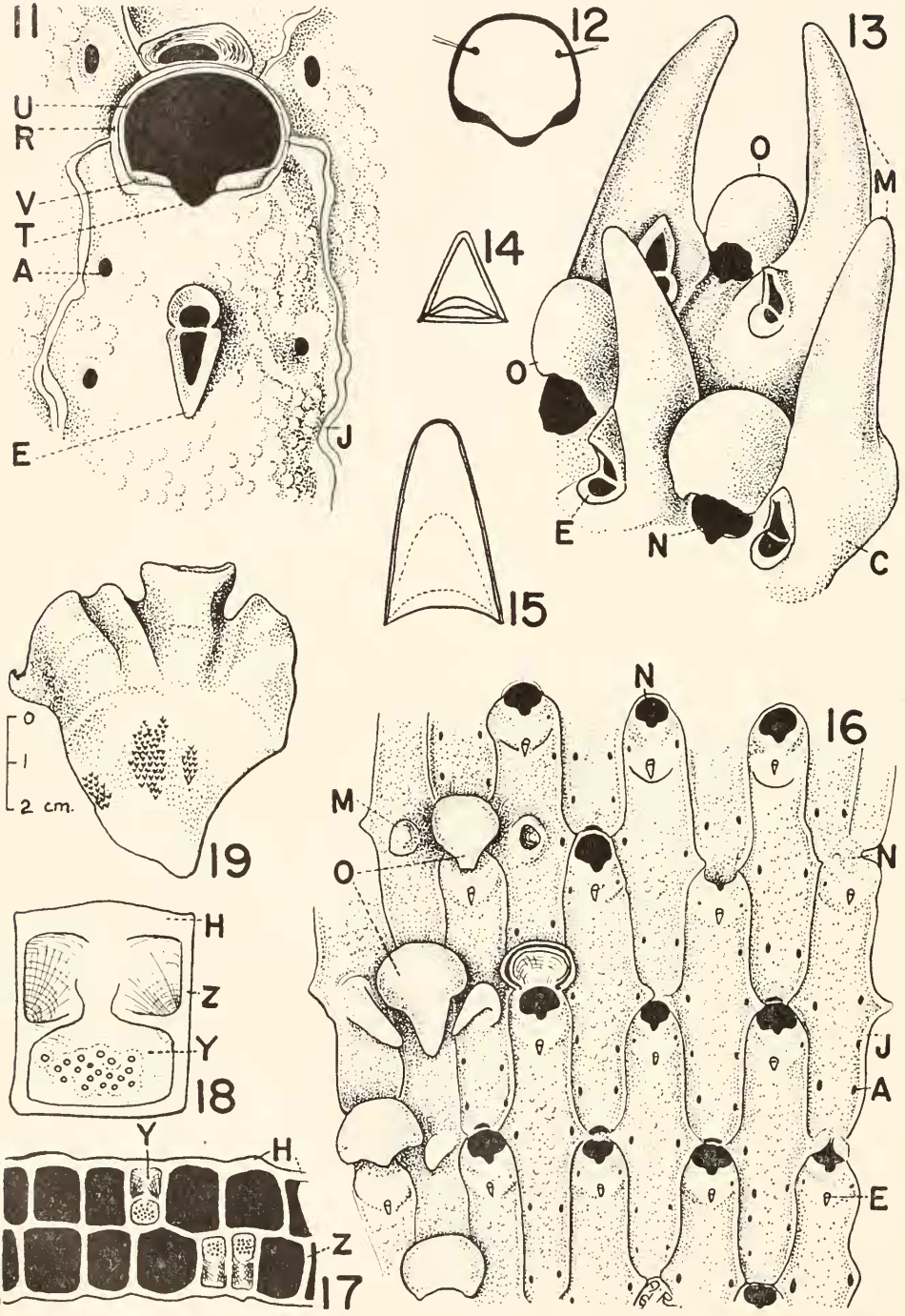

PLATE II.

front by a crease or groove that extends between the two paraorificial areolae (Fig. 5) but this later is obliterated. In *C. daedala* the cusps are transverse. In *T. absidatum* they are more vertical or obliquely arched.

Operculum. The operculum is rather delicate but reinforced by a long curved chitinous sclerite or reinforcement at each side (Figs. 7, 8). The sclerite is for muscle attachment. The extent or length of the sclerite depends on the degree of chitinization of the operculum. The operculum is shaped to fit the distal semicircular anter of the orifice and the intercardellar gap rather than the more external sinus.

Spines. Non-ovicelled zoids have 5 to 7 peristomial spines around the hemispherical part of the orifice. On ovicelled zoids the distal part of the orifice is not visible, so whether spine bases are present distally cannot at present be determined, but there is a thick spine at each side of the orifice just proximal to the side of the ovicell (Figs. 2, 5).

The spines are coarse and jointed at the thick base. The bases of the proximal pair are a bit sturdier or bigger on some zoids.

Ovicells. In general appearance the *Toretocheilum absidatum* ovicells resemble those of the genus *Stephanosella* and of Stach's *Chaetostella gabrieli* and Brown's *C. enigma.*

The *T. absidatum* ovicell is deeply immersed in the frontal of the next distal zoid. Also, it hides the distal part of the orifice of its own zoid. Its very own aperture cannot be seen from the front because the ovicell overhangs so. The peristome does not encroach upon the ovicell.

The ovicell has two calcareous layers, the ectooecium and the entooecium. Brown's (1952, p. 36) interpretation of these two layers is here followed. The layers are separated by a very narrow space. The entooecium is globose, rough-

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PLATE II

All figures on this plate are of *Isoschizoporella tricuspis* (Calvet) 1909. All except Figures 14 and 19 are drawn with a camera lucida. Figure 13 is from Sta. 226 material, the rest are from Sta. 234 specimens.

FIGURE 11. Detail of distal third of zooecium, showing well calcified beaded frontal wall and a characteristic uncalcified space above the orifice. The avicularium is prominent enough but the avicularial chamber is immersed and the heavy calcification makes it inconspicuous.

FIGURE 12. Operculum. Tendon fibers are attached to the two distal muscle dots.

FIGURE 13. Three ovicells flanked by aviculiferous spines.

FIGURE 14. Diagram of a suboral avicularial mandible.

FIGURE 15. Mandible of a spinal avicularium.

FIGURE 16. Portion of a colony showing both ovicelled and non-ovicelled zooecia. Some zooecia have the large frontal spines. One of the spines and one ovicell are broken, in the fourth row from the left. In the row at extreme right the two lower zooecia show degrees of occlusion of orifice by secondary calcification. The orifice of the upper one is completely calcified and overgrown. That of the lower right is partly so. The upper zooecium has given rise to two new rows of zooecia.

FIGURE 17. Cross-section through 15 zooecia of a bilaminate colony. Zooecial cavities are in black, zooecial walls are in white. The two layers of zooecia are back-to-back. The three filled in compartments are the end walls (*cf.* Fig. 18).

FIGURE 18. End or distal wall of a zooecium, showing the interzoidal communication pores or sieve plate in bottom half and the pattern or lines of calcification in the upper half.

FIGURE 19. Piece of a bilaminate blade or frond of a colony, drawn to the 2 cm. scale at left. The three darker patches on the lower half are spined and ovicelled areas.

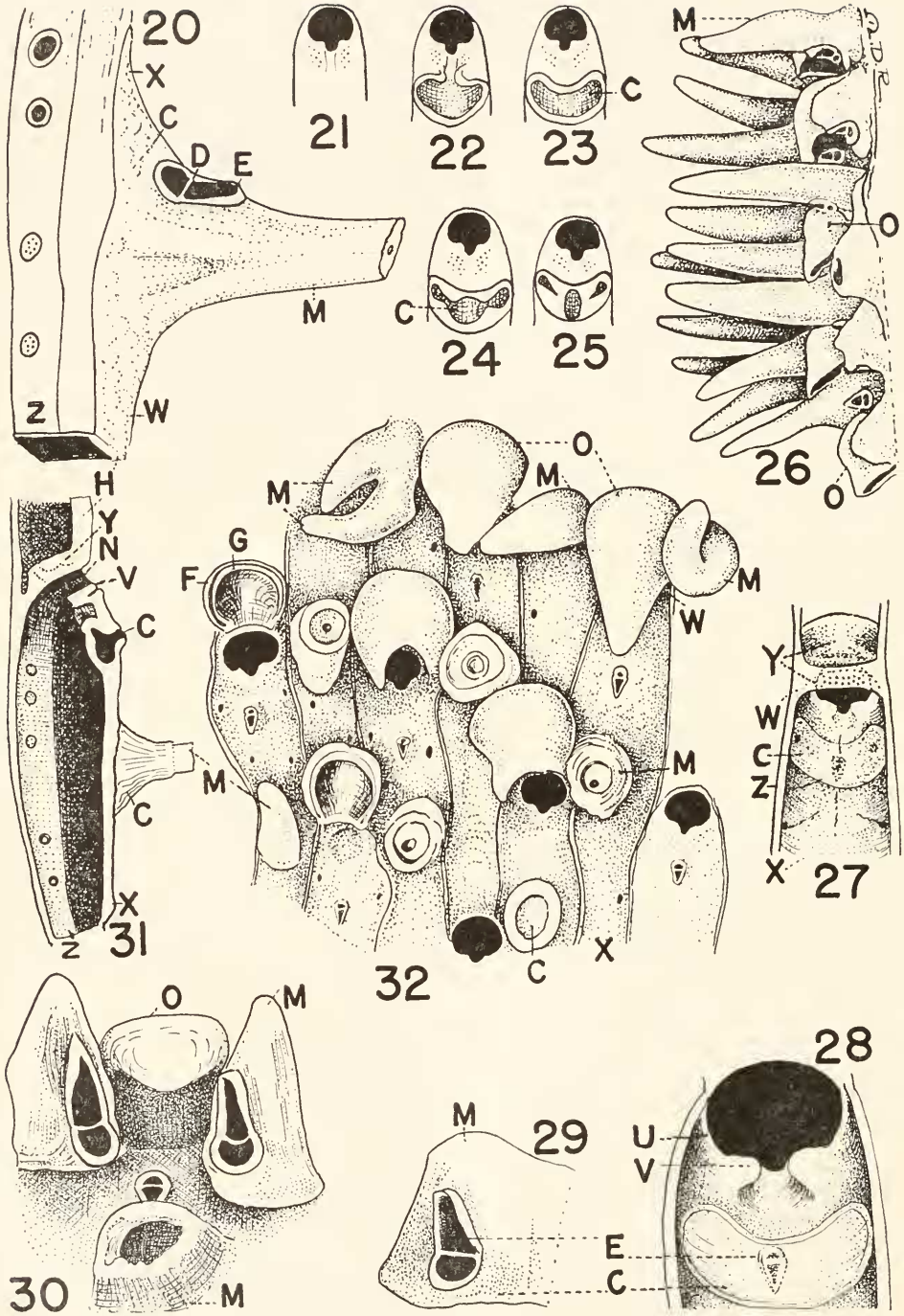
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PLATE III.

ened and complete. The ectooecium forms a partial incomplete shallow shell or band about the lateral and distal periphery of the entooecium.

Areolae occur in the ectooecium. Faint depressions emanate from these areolae. The ectooecium grows upward from around and between them to form the band about the entooecium. At the advancing border of the ectooecium the entooecial surface appears tucked or crowded because of the peculiar growth method or encroachment of the ectooecium. Not enough material was available for a more detailed study of the ovicell.

Distribution and ecology. A flat rock, measuring roughly about 17 cm. long, 10 cm. wide and 3 cm. thick, well encrusted with a dozen species of bryozoa and sponge, contained four small patches of *Toretocheilum absidatum.* These were on the side of the rock and colony fragments had to be chipped off or calcined off for study under the compound microscope.

The rock came from a depth of 40 fathoms, from USN Sta. 240 of Marguerite Bay, Antarctica, Comdr. D. C. Nutt collector. The specimens will be deposited

PLATE III

All figures on this plate are of *Isoschizoporella tricuspis.* All except Figures 21 through 25 are drawn with a camera lucida. Figures 20, 26, 29 and 32 are from Sta. 226 material. The rest are from Sta. 234.

FIGURE 20. Portion of zooecium, showing aviculiferous spine, frontal and lateral walls. The lateral wall has two pore plates (the two lower porous discs) and the "corresponding openings" (the two upper doughnut-shaped discs). The pore plates of one zooecium line up with the corresponding openings of its neighbor zooecia and vice versa.

FIGURES 21 THROUGH 25. Diagrams of external surface of frontal wall, depicting stages in the formation of the suboral avicularial chamber.

FIGURE 21. Zooecial front before an avicularial chamber has begun to form.

FIGURE 22. The avicularial chamber is outlined by a growing calcareous rim. The border is still incomplete distally.

FIGURE 23. Avicularial chamber now completely outlined.

FIGURE 24. Borders of the avicularial chamber growing and approximating.

FIGURE 25. Roofing over and fusion stage of avicularial chamber formation. Three open spaces still remain but these will be reduced in time to two areolar pores and an avicularium.

FIGURE 26. Side view of a spiny patch of colony with hooded ovicells between the spines. The spines at extreme right are either low or broken off and the ovicells can be seen just beyond them.

FIGURE 27. Back wall removed to show the interior of the front wall and the relative position of the distal wall. The distal wall with its sieve plate hides half the orifice. Cardelles and avicularial chamber also are visible from this side.

FIGURE 28. Enlargement of inner surface of orifice, cardelles, peristomial and vestibular sinuses and avicularial chamber. The avicularium shows through the translucent wall.

FIGURE 29. Early stage in the development of an aviculiferous spine. At this stage the avicularium and its chamber are present and the spine will result from the growth of the tip of the mound.

FIGURE 30. A more advanced stage in the growth of an aviculiferous spine. Two such spines flank a broken ovicell. Between their base lies a suboral avicularium. In the foreground is an exposed avicularial chamber of another aviculiferous spine (broken off).

FIGURE 31. Sagittal section through a zooecium. The darkest areas represent the zooecial and avicularial cavities. The upper three circles in the gray lateral wall are the pore plates. The two lower circles are the "corresponding openings" which would fit next to the pore plates of a neighbor zoid.

FIGURE 32. An ovicelled, spined, well calcified section of a colony. The upper tier of zooecia shows a curved spine and a double spine. The four spines of the middle and lower tiers are broken off. Ovicell shapes are variable. Two left ovicells are broken off and reveal the double calcareous wall.

with the Smithsonian Institution, U. S. National Museum, after the other species on the rock have been thoroughly studied.

GENUS *ISOSCHIZOPORELLA*, NEW GENUS

Diagnosis. Orifice suborbicular, with V-shaped sinus in its proximal lip. The two ends of the C-shaped vestibular arch stop at the sinus and form ledges (cardelles) to support the operculum. Operculum has two muscle dots distally and a proximal median tab to fit the sinus. Frontal wall smooth to beaded, flattened except for avicularial chamber and bordered by faint mural rim. Median suboral avicularium with mandible usually proximally directed present some distance below orifice. The reniform, bilaterally symmetrical avicularial chamber extends across the entire front wall and has a lateral pore on each side usually. Other avicularia are present in association with stout umbonate spines or tumid mounds. Frontal wall a pleurocyst, punctured by only a few peripheral pores spaced far apart and with bilateral symmetry. Ovicell globose to hood-like, smooth to granulated, imperforate, with double calcareous wall. Ovicells may grow downward over orifice.

Name derivation. The name *Isoschizoporella* was coined from the Greek word *isos* meaning like or equal and the already long existing generic name *Schizoporella* which was derived from *schizo* (to divide), *poros* (pore) and *ella* (diminutive).

Genotype. The genotype, here chosen for the new genus *Isoschizoporella,* is *Schizoporella tumida* var. *tricuspis* Calvet 1909, here elevated to species rank: *Isoschizoporella tricuspis* (Calvet).

Remarks. The reason for the erection of this new genus was two-fold. Firstly, there was need to set up a taxon for a troublesome species which had a schizoporellid orifice but which possessed other features which disqualified it from the presently restricted family Schizoporellidae. Secondly, the troublesome species seemed to belong to the family Hippoporinidae but possessed a totality of characters that would not permit its uncontested inclusion in any presently known hippoporinid genus. So it was thought best to erect a new genus for it, since this is a very rare form restricted to the Antarctic and sub-Antarctic regions.

The character by which *Isoschizoporella* differs from the family Schizoporellidae and resembles family Hippoporinidae is the nature of its frontal wall. *Isoschizoporella* has a pleurocyst, as does the family Hippoporinidae, while the Schizoporellidae have a tremocyst. A pleurocyst is a frontal wall that is granular, imperforate over the central area and perforated only around the periphery by areolar pores. A tremocyst is a frontal wall usually liberally sprinkled all over with pores.

The *Isoschizoporella* pleurocyst has a few elongate inconspicuous peripheral pores, very widely spaced, usually placed with bilateral symmetry at zooecial corners, and some elsewhere en route, like the paired pores of some Reteporidae as *Iodictyum* (Harmer, 1934; pp. 515, 522) in particular. The *Hippadenella carsonae* (Rogick, 1957b; Plate I) frontal is almost identical with that of *Isoschizoporella* but the orifice, operculum and ovicells are different.

Synonymy and previous records:

1909. *Schizoporella tumida* Hincks 1881, var. *tricuspis*. Calvet, pp. 28–30; Pl. III, Figs. 1–3. Excellent description and figures showing ovicelled and non-ovicelled zooecia, operculum and suboral avicularial mandible. No measurements given. From 30 meters' depth at Booth Wandel Isle and 110 meters' depth in Biscoe Bay.

1924. *Schizoporella tumida* var. *tricuspis*. Thornely, p. 12. Commonwealth Bay, Sta. 1, Lat. 66°50′ S., Long. 142°6′ E. at 354 fathoms.

1928. *Schizoporella tumida* var. *tricuspis*. Livingstone, pp. 7, 52.

1957a. *Schizoporella tumida* var. *tricuspis*. Rogick, p. 8, USN Sta. 226, Marguerite Bay. Ecological note.

The above are the only records of this species up to date.

Diagnosis. Colony bilaminate, foliaceous; smooth except for spiny or ovicelled patches. Zooecia long, narrow, flattened, bracket-shaped. Mural rims thin, faintly salient. Frontal a granulated or beaded pleurocyst with a few paired peripheral pores. A small median oval to pointed suboral avicularium sits atop the wide immersed reniform avicularial chamber. A stout tusklike aviculiferous process ("spine") occurs on the midfrontal of zooecia adjacent to an ovicelled zoid. Some zoids without spines or ovicells. Ovicell imperforate, granular, shaped like an elephant's head, overhanging the zooecial orifice, usually flanked on each side by its neighbors' aviculiferous frontal spines. Zooecial orifice and operculum as in genus. The median V-shaped peristomial sinus is less than half the width of the proximal lip. Zooecial orifice is at distal end of frontal and is touched by the frontals of the three adjacent zoids. Distal to orifice, at the beginning of the next zoid is a membranous area, crescent-shaped. Zooecial end wall a sieve plate. Four or five multiporous pore plates or corresponding openings present in each lateral wall.

Measurements. All readings are in millimeters. H is for height; D is for diameter at base.

1.181–1.991	(1.506)	L	zooecia, 20 readings
0.272–0.432	(0.351)	W	zooecia, 20 readings
0.144–0.173	(0.158)	L	orifice, including sinus
0.173–0.202	(0.184)	W	orifice
0.143–0.176	(0.163)	L	operculum
0.166–0.195	(0.182)	W	operculum
0.446–0.619	(0.531)	L	ovicell, including its beak
0.317–0.461	(0.413)	W	ovicell
0.072–0.115	(0.093)	L	suboral avicularium
0.043–0.072	(0.055)	W	suboral avicularium
0.156–0.234	(0.190)	L	spinal avicularium, 8 readings
0.091–0.137	(0.107)	W	spinal avicularium, 8 readings
0.760–1.177	(1.039)	H	frontal spine
0.377–0.514	(0.456)	D	at widest part of spine base avicularial chamber
0.260–0.358	(0.311)	D	at narrowest part of spine base avicularial chamber
0.046–0.078	(0.061)	L	mandible of suboral avicularium

0.039–0.065 (0.051) W mandible of suboral avicularium
0.117–0.130 (0.124) L mandible of spinal avicularium, 2 readings
(0.130) W mandible of spinal avicularium, 1 reading

Remarks. Calvet's hesitancy (1909, p. 28) about the identity of his *tricuspis* and its exact relationship to *Schizoporella tumida* Hincks (1881, p. 13, Pl. I, Fig. 3) is understandable in view of the brevity and incompleteness of Hincks' description and illustration. Hincks' figure shows four non-ovicelled zooecia and a mound bearing a special avicularium. This mound is described by Hincks as "frequently an ovate rising on the side of the cell extending from the orifice down a considerable portion of its length, bearing on its upper extremity an immersed avicularium, with pointed mandible directed downwards." The *S. tumida* ovicell is described as "globose and prominent, with a smooth surface."

Hincks neither mentions nor figures the frontal pores or frontal spines and the ovicell is apparently without the downward orifice-covering beak. Also, the position of the suboral avicularium is much closer to the orifice in *S. tumida* than in *Isoschizoporella tricuspis*. *Schizoporella tumida* Hincks was collected in the Bass Straits of Australia, while *Isoschizoporella tricuspis* is known only from the Antarctic. In these ways then does *S. tumida* differ from Calvet's var. *tricuspis*, so it is best to elevate Calvet's variety to species rank.

Colony. Colony color is light écru. Judging from the fragments the colony should be good sized, foliaceous or fan-shaped, with crinkled edges. In the USN collection were a number of chips or fragments, none of them a complete colony. The largest piece was 67 mm. long by 60 mm. wide, and probably represented less than half a colony because it was a portion of the growing edge, apparently some distance away from the base of the colony, judging by its width.

Some of the pieces have occasional faint markings, like growth rings (Fig. 19). New linear or radial rows of zooecia are added in such zones, or when needed, to make possible the ever widening periphery or ruffled edge of the colony.

Colonies are bilaminate and solid, with zooecia back to back, and mostly smooth. Occasional bristly patches occur on either face (Figs. 13, 16, 19, 26). These patches represent areas where ovicells and aviculiferous spines have arisen. One such patch was 12 mm. long by 10 mm. wide.

Sometimes secondary calcification closes over the zooecial orifices (Fig. 16) but the suboral avicularia and frontal pores seem much more resistant to secondary filling-in. The secondary calcification seems to begin with the operculum itself. It fills in or frosts over lightly, then more solidly till the whole orifice is like the surrounding frontals.

Colonies are relatively clean, living zoids apparently being resistant to encrustation with extraneous material, but dead parts show some settlers.

Soft parts. Many zoids had opercula and mandibles. Far fewer contained polypides (gut, tentacles, musculature). These polypide remains, when present, were very slim, in keeping with the slenderness and elongation of the zooecia and also perhaps the food supply was insufficient. Some of the zoids had the opercula fouled or rimmed about by a border of scummy orange-colored material, as if wastes had accumulated about the orifice and killed the zooecia. It was not possible to determine if embryos were present in ovicells because the ovicells are so opaque.

Suboral avicularium. A suboral avicularium develops on nearly every zoid. It is median, oval, with a triangular mandible that is proximally directed (*cf.* Figs. 11, 14). Most of the suboral avicularia are so oriented longitudinally but occasional ones do occur a bit off course. That is, their slant may be slightly oblique, to right or left. One colony fragment from USN Sta. 234 contained a zoid whose suboral avicularium pointed transversely while the rest of the suboral avicularia in that fragment were oriented in the usual manner.

Sometimes the mandibular area tip (rostrum) is flat against the frontal ("chest"), other times its tip is more elevated.

The suboral avicularium forms after its reniform chamber is complete (Figs. 11, 21–25, 27, 28, 31). The floor of the chamber is the zooecial frontal wall. The chamber stretches from lateral wall to lateral wall. The chamber walls grow upward from the zooecial frontal, converge in a transverse line that has three diminishing gaps in it (Figs. 22–25). These gaps are the two lateral pores and the median avicularium. The mandibular area, back area and pivot develop over the median gap. At the base of the chamber, particularly on the lateral side, can be found the aforementioned pore and perhaps another one, puncturing the chamber.

Aviculiferous spines. The big tusk-like frontal spines are present on some zoids, either ovicelled or non-ovicelled, and absent from others. They are aviculiferous, *i.e.*, house an avicularium and avicularial chamber in their base (Figs. 13, 20, 30, 31). When present, there is generally only one spine per zoid. An occasional spine may be forked (Fig. 32) but most of them are not. Some of the spines are straight, some curved. They are tall, thick-walled, wide at the base and taper to a blunt tip and sometimes look corrugated. They are hollow, the basal part being especially large (Figs. 20, 31). The cavity of the spine is not continuous with the cavity of the zooecium. The basal part of the spine cavity is the avicularial chamber.

These spines arise as calcareous blisters on the midfrontal wall of a zoid (Figs. 31, 32). They sprout close to a neighbor's orifice and ovicell as if to protect both (Figs. 16, 32). One wonders what influence, if any, the developing ovicell or developing embryo of a zoid exerts on neighboring zoids to cause them to produce the protective aviculiferous spines.

When still in the first stage of formation the avicularial spine base is very extensive. One was 0.247 mm. wide by 0.52 mm. long, as wide as some of the zooecial fronts. The base is oval or reniform in outline. Strictly speaking the spine base represents the avicularial chamber.

The avicularium at first is oblique in position like a door leaning against a mound. But, with the continued upward growth of the mound to form a hollow spine the position of the avicularium shifts until it is roughly vertical, *i.e.*, at right angles to the zooecial plane. The avicularium appears as if propped up against or incorporated into the proximo-lateral side of the spine. Its duckbill-shaped mandible (Fig. 15) is larger than the triangular mandible of the suboral avicularium. Also, the suboral avicularium itself is smaller than the spine avicularium. The mandible of the spine avicularium is directed toward the tip of the spine (Figs. 20, 26).

In the USN material these aviculiferous spines develop in the vicinity of ovicells or orifices of ovicelligerous zoids, leaning toward the ovicells. Generally an ovicell

has an aviculiferous spine on each side of it (Figs. 13, 16) but there can be exceptions. Occasional ovicells may share a spine between them. Still others may have but a single spine beside them.

Interzoidal communications. In *I. tricuspis* the end walls of zooecia are generally single partitions or transverse septa between succeeding zoids in a linear or radial series, *i.e.,* two zoids share the same single end wall between them. The lateral walls are double, each neighboring zoid having its own individual lateral wall. Therefore it is not surprising that the interzoidal communications between zoids should be different in the two different kinds of walls. Silén (1944) made an extensive study of this situation in a number of different species.

In *I. tricuspis* the transverse and the lateral walls are perforated, but differently. The end wall is truncated, *i.e.,* divided into two sections, one with the porous sieve plate, the other without pores (Figs. 17, 18, 31). The sieve plate is nearer the basal wall than is the non-porous section and slants away from the basal wall at about a 45° angle. The other section is more nearly vertical with respect to the basal wall. The number of closely set pores in the slanting sieve plate is hard to count but one zoid had about 16, more or less.

The lateral wall has 4 or 5 multiporous pore chambers or corresponding openings (Figs. 20, 31). These blister-like pore chambers have fewer pores, about 3 to 8, than do the sieve plates.

Distribution and ecology. A small number of fragments, about 18, and none of them a complete colony, of *Isoschizoporella tricuspis,* were collected by the 1947–1948 USN Expedition from two stations in Marguerite Bay, Antarctica, Sta. 226 and 234, from depths of 40 fathoms. These localities are near that from which Calvet's specimens came. The Thornely specimens were collected at opposite sides of the Antarctic continent and from a considerably greater depth, 354 fathoms. So, although the species showed up in very small quantity in the collections of only three Antarctic expeditions, its occurrence at opposite sides of the pole would suggest a circumpolar distribution.

The USN specimens were relatively clean of encrustation by other forms but a few bryozoans did gain a foothold on some of the fragments. One *Beania erecta* zoid and a lichenoporoid cyclostomatous bryozoan colony, to be identified later, grew on the Sta. 226 fragment. Species found on the Sta. 234 fragments included the bryozoans *Osthimosia milleporoides* (Calvet) 1909, *Phylactellipora lyrulata* (Calvet) 1909 and *Ramphonotus inermis* (Kluge) 1914 and foraminifera.

The *I. tricuspis* specimens will be deposited with the Smithsonian Institution, U. S. National Museum.

Summary

1. Two new genera, *Toretocheilum* and *Isoschizoporella,* of the family Hippoporinidae (Bryozoa, Cheilostomata) have been erected on the basis of their orifices and areolated frontal walls.

2. One new species, *Toretocheilum absidatum,* was described. Another, *Schizoporella tumida* var. *tricuspis* Calvet 1909, was elevated to species rank and transferred to a new genus: *Isoschizoporella tricuspis.*

3. Both species are amply illustrated, measurements given and the description for *I. tricuspis* has been amplified. Attention is given to the range of variation of each species.

4. Each species is designated as the genotype of its new genus. Both species are from Marguerite Bay, Antarctica.

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